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REMARKS

Claims 1-21 are pending.

No new subject matter has been added to the specification or claims.

Claims 12, 13, 20 and 21 were objected to for informalities which have been corrected by the amendments to the claims.

Claims 1, 9 and 14 were rejected under 35 U.S.C. §102(b) over Inui et al. (US6074052). Claims 2-5, 10 and 15 were rejected under 35 U.S.C. §103 over Inui et al. (US6074052) in view of Cleary et al. (US6457823). Claims 6-7, 11-12, 16-17 and 19-20 were rejected under 35 U.S.C. §103 over Inui et al. (US6074052) in view of Takemoto et al. (US6084619). Claims 8, 13, 18 and 21 were rejected under 35 U.S.C. §103 over Inui et al. (US6074052) in view of Lin et al. (US5531818). These rejections are respectfully traversed as follows.

Response to claim rejections under 35 USC § 102(b)

U.S. Patent No. 6,074,052 to Inui discloses a printing method using, in addition to ink, a "printability improving solution" to improve the quality of printed images. The ink had a low penetrability whereas the printability improving solution has a high penetrability (Col.6, lines 20-22). In the discharge process, the printability improving solution is discharged on the recording medium between two discharges of ink (Col. 6, lines 43-46). The printing process according to Inui thus essentially comprises three steps: (i) discharging a first ink onto the printing medium, (ii) discharging a printability improving solution onto the image formed in the first step and (iii) discharging a second ink onto the image formed in the second step (Col. 3, lines 42-51). In embodiment 1 of the '052 patent, the first ink and the second ink have a same surface tension of 48 dynes/cm (Col. 7, lines 55-56).

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Inui et al. teaches the use of an additional printability improving solution, in addition to the ink, to improve image quality. The printability improving solution is "a solution containing a material which insolubilizes or coagulates a coloring material contained in an ink" (Col.4, lines 48-50). The printability improving solution is therefore not an ink and thus is not part of an ink set. It is further essential that the printability improving solution is printed in between the printing of subsequent ink drops, as made very clear in the description in Col.6, line 20-49 and also shown in Figs. 3A-3D.

From this brief assessment, it is immediately clear that pending independent claim 1 (i.e. the progressive dot printing ink-jet process) is new over Inui et al. in that Inui et al does not disclose (1) applying a second ink drop on to a first ink drop (but instead on to a printability improving solution drop) and (2) the first and second ink drops having a different viscosity, surface tension or curing speed. Also pending independent claim 9 (i.e. the set of ink jet inks) is new over Inui et al as the two black inks in embodiment 1 of the Inui et al. disclosure, and referred to by the Examiner, have the same surface tension.

In order to sustain a §102 rejection, each and every feature of the claims must be taught by the reference. Since this is not the case, as argued above, the §102 rejection is respectfully overcome.

Response to claim rejections under 35 USC § 103

Inui et al. (U.S. Pat. 6,074,052) further discloses in embodiment 6, not cited by the Examiner, a yellow, magenta and cyan ink having a surface tension of 42 dynes/cm and a black ink having a surface tension of 44 dynes/cm. Embodiment 6 further refers to the discharge scheme of Fig.9 where a black image area is printed adjacent a color image area. The color image area is printed with the yellow, magenta and/or cyan ink only and therefore all inks

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printed dot-on-dot in this area – supposing a curtailed printing pattern for the printability improving solution is used as for example in Fig.9B – are of the same surface tension. The black image area is printed with the black ink only and therefore the ink printed dot-on-dot in this area – supposing a curtailed printing pattern for the printability improving solution is used as for example in Fig.6B – is of the same surface tension. Inui et al. clearly teaches towards using the same surface tension for inks to be printed in the same image area. Inui et al. does not disclose other ink properties as surface tension or curing speed.

Cleary et al. (U.S. Pat. 6,45,823) discloses an ink jet printing method and print head arrangement wherein a carriage holds a series of ink jet print heads which may deposit four layers of ink simultaneously on a region of the substrate located beneath the four sets of print heads (Cleary et al., Col. 4 lines 39-43). Cleary et al. further discloses that the paths w1-w2-w3 successively printed with the print head arrangement do not overlap (Col. 5 lines 17-34). They thereby implicitly discloses that during the printing of a single path, the ink drops from the four different colors of ink may be printed drop-on-drop before they are exposed to an amount of energy, referred to as the “set energy”. Cleary et al. does not disclose that successive ink drops printed drop-on-drop have a different viscosity, surface tension or curing speed. Cleary et al. neither discloses that the viscosity, surface tension or curing speed of ink drops printed drop-on-drop vary in a graduated manner within a given range from the first to the last drop applied.

Takemoto et al. (U.S. Pat. 6,084,619) discloses an ink jet printing method wherein a reaction solution and an ink are deposited on a recording medium. The reaction solution is meant to react with the ink so as to improve image quality (e.g. reduce feathering, reduced color bleeding or reduce paper cockle). About 2½ columns of the printed patent specification are dedicated to describing the reaction solution and about 3 columns are used to describe the ink

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composition. From this observation it must be clear to the Examiner that the reaction solution disclosed by Takomoto et al. is different from, and not to be considered, an ink. Instead, depending on the particular application method used (see Col.4, lines 57-67), the reaction solution should be considered a pre-coat (as disclosed in U.S. Pat. 5,748,208 to Uchiyama et al already on file), a printability improving solution (as disclosed in U.S. Patent No. 6,074,052 to Inui et al discussed above) or a post-coat or fixing promoter. The text passage cited by the examiner (Col. 3, line 66 to Col. 4, line 17) therefore only confirms the common practice at that time that ink jet inks were designed to have similar physico-chemical properties (see previous communications with the Examiner). The text passage even teaches that the reaction solution is preferably designed to have substantially the same viscosity than the ink composition (Col.4, lines 9-10). Concluding, Takemoto et al. does not disclose a first and a second ink having a different viscosity, surface tension or curing speed.

Conclusion

None of the three prior art documents cited by the Examiner discloses a first and a second ink drop, applied one on to the other and having a different viscosity, surface tension or curing speed. It must be clear that the "liquids" disclosed in some of the prior art documents on file for improving image quality can not be considered inks for the reasons discussed above. Also, none of the cited references provides a teaching or for using inks with different viscosities, surface tensions or curing speeds. Hence even if the cited references were combined, the present invention as claimed would not result.

Moreover, attempts in the prior art to improve image quality achieved by ink jet printing processes are directed towards the use of additional liquids different from the ink or to the use

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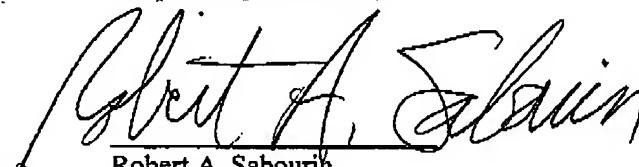
of inks with different surface tensions in different image areas, but never to the use of inks having a different surface tension, viscosity or curing speed in the same image area.

The prior art made of record and not relied upon has been reviewed but is not considered material to the patentability of the invention.

It should be noted that the above arguments are directed towards certain patentable distinctions between the claims and the prior art cited. However, the patentable distinctions between the pending claims and the prior art cited are not necessarily limited to those discussed above.

In view of the foregoing remarks and amendments, it is respectfully submitted that each rejection of the Office Action has been addressed and overcome so that this application is now in condition for allowance. The Examiner is respectfully requested to reconsider the application, withdraw the rejections and/or objections, and pass the application to issue. Should questions arise during examination, the Examiner is welcome to contact the applicant's attorney as listed below.

Respectfully submitted,



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